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The Homing Instinct.

AN EXPLANATION SUGGESTED

—BY—

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*"Prudens Questiodimidium
scientiæ est."*

I. As to the fact I shall briefly epitomize several examples that have come to my knowledge, or that I have observed, and which are trustworthy so far as trustworthy human testimony can make them.

Observation 1.—"Ben," a thoroughbred setter dog, was taken from his home, Norton, Mass., by railroad to Boston, and thence by the Old Colony Railroad to Wollaston Heights, a distance of thirty-five miles. He escaped, and in five hours barked at the door of his old home.* *

Observation 2.—"Jack," a Newfoundland, was taken from his home at Locust Bay, Long Island, N. Y., to Brooklyn, and thence

* NOTE.—An essay embodying the ideas of the present one was sent to the *American Journal of Psychology* about a year ago. To the great chagrin of both writer and editor (for I preserved no copy of the writing) the manuscript, soon after its receipt, disappeared from the editorial pigeon-hole, in a very mysterious manner, and has never been heard from since.

* * NOTE.—For full particulars, giving the owners' names, dates, etc., etc., see *The Homing of Dogs*, by my friend Mr. W. R. Lord, of Wollaston, Mass., (Published by the author).

by carriage to Sheepshead Bay. He escaped, and appeared at his old home, thirty-five miles distant, in three days. He had a cord about his neck, bitten off, that showed the cause of his detention *en route*.* *

Observation 3.—A collie was sent by express from Boston to Hartford, Mass. So soon as he was released he disappeared, and was at his former home in Boston, footsore and worn, in about ten days. The distance is about 100 miles.* *

Observations 4 and 5.—An Irish fox hound, "George," lost in a deer-hunt returns 125 miles, and "Singwell," a hound, returns home 125 miles, both within about twenty-four hours.* *

Observation 6.—Several hounds that were being transported from Morgan County, Georgia, to Live Oak, Ark., escaped from the freight car at Memphis, and "in a short time appeared at the old home utterly starved and worn out—the distance being about 500 miles, air-line."* *

Observation 7.—A fox-hound, "Chorus," was sent from Albermarle County, Va., to Columbia, S. C. The dog remained quiet for twelve days, when he showed great anxiety and restlessness, and disappeared. In seventeen days the dog arrived at his home, having traveled at least 400 miles.* *

Observation 8.—Another dog of the same family returned from Alabama, a distance of not less than 800 miles.* *

Observation 9.—In a private letter written since the pamphlet quoted, Mr. Lord says : “I have an authentic account of a dog making 1,000 miles.”

Observation 10. — In 1872 I saw 600 pigeons liberated in the Champs Elysees, at Paris. They had been brought in closed wicker-baskets from Belgium. At a given signal the covers were raised together, and the birds rose almost as a solid body, and, as if actuated by a single nervous center, moved without wavering or doubt in the direction of their home, where they arrived so soon as their wings could carry them.

Observation 11.—An intelligent farmer living in Kentucky, told me he once brought home in his overcoat pocket a tiny pig, one of a dozen, that he found in a cave three or four miles from home. The mother had wandered there just prior to being brought to bed. Mr. B—— thought he would raise the youngster “by hand,” as a sort of a pet, I think, but piglet had other ideas; and though its eyes were hardly open, it managed to escape that night, swam the river, and found the maternal breast. Its footsteps were traced the next day down to

the river bank. The country is exceedingly rough, being a succession of almost perpendicular bluffs and hills.²

Observation 12.—An acquaintance told me he once took some little kittens in a bag, and, as he supposed, with sufficient precautions to prevent their escape, he threw them into the river a couple of miles from his house. He then continued riding beyond this point. Returning by the same road later in the day he overtook the poor little half-drowned wretches, one by one, making their difficult but certain way homeward.

Observation 13.—A pointer-puppy, "Hector," was sent from Cincinnati to Portsmouth, Ohio. "He returned by ways and

² NOTE.—This case suggests a number of pertinent and interesting questions and experiments. Does birth at a place, or duration of intrauterine life in a locality, determine the establishment there of the home, as against the previous home of the mother? At what stage of foetal or early life would the two forces become equal? Would eggs of the carrier pigeon just hatched, or the half-grown birds themselves, removed, render the return flight less certain? How long in various animals does it take domiciliation to establish a new equilibrium of the magnetic forces? My kitten after our moving across city, was sick and a torment to us for ten days, when he escaped from the house, and evidently seeking the old home, was absent two days or more. He never appeared at the old home, and finally returned to home No. 2, where he has lived contented enough since he failed to find No. 1. Mr. Lord calls attention to the suggestive fact that the cat, the most domesticated animal, has the strongest and surest homing instinct, and shows the greatest unrest when removed. Its love, too, is for the *locus*, not for the persons.

means known to himself alone, once from Portsmouth, and twice from Lucasville, Scioto County, the last time in a blinding snow-storm." 3

Observation 14.—The same dog was drugged with an alcoholic solution of morphine, and sent to Somerset, Ky., in a freight car. He slept most of the trip, but escaped from the car before reaching his destination, and "at 10 A. M. on the following day he turned up in Cincinnati, having run a distance of 142 miles in about twenty-eight hours."

Observation 15.—The same dog was "fuddled with ether," put in a wicker-basket, after "bandaging his nose with a rag that had been scented with a musky perfume." In this condition he was taken southwest to Danville Junction, thence east to Crab Orchard, and finally northeast to near Berea, in Madison County, Ky. When released he "slunk off into a ravine, scrambled up the opposite bank and scampered away, at a trot first, and by-and-by at a gallop—not toward Crab Orchard, *i. e.*, southeast, but due north, towards Morgan's Ridge and Boonsboro, in a bee-line towards Cincinnati, Ohio. They saw him cross a stubble-field, not a bit

3 See a *Zoological Enigma*, by Felix L. Oswald, M. D. *Popular Science Monthly*, (some years back).

like an animal that had lost its way and has to turn right and left to look for landmarks, but, 'like a horse on a tramway,' straight ahead, with his nose well up, as if he were following an air-line toward a visible goal. He made a short *detour* to the left to avoid a lateral ravine, but farther up he resumed his original course, leaped a rail-fence, and went headlong into a coppice of cedar-bushes, when they finally lost sight of him." "A report to the above effect, duly signed by the Berea witnesses, reached the dog's owner on February 4, and on the following day Hector met his master on the street, wet, and full of burrs and remorse, evidently ashamed of his tardiness. That settled the memory question. Till they reached Crab Orchard the dog had been under the full influence of ether, and the last thing he could possibly know from memory was a misleading fact, viz., that they had brought him from a southwesterly direction. Between Berea and Cincinnati he had to cross three broad rivers, three steep mountain ranges, and had to pass by or through five good sized towns," *etc., etc.*⁴

Observation 16.—"According to a well authenticated report, the crew of a British

4. See *a Zoological Enigma*, by Felix L. Oswald, M. D., *Popular Science Monthly*, (some years ago).

East Indiaman caught an enormous tortoise near St. Helena, marked it with the brand of the company, and quartered it in the cockpit. But in the English Channel their captive crawled on deck and plunged overboard. Two years after, the same tortoise was caught in Sandy Bay, near Jamestown, on the South coast of St. Helena. No ocean current could have carried it there; it must have navigated by its inner compass a distance of seven thousand English miles." *

There is hardly a person who has been a lover and observer of animals that could not add to the above many similar instances. Almost every household has some such story. Everyone has marvelled of the oft-repeated, beautiful experiments with carrier-pigeons. The yearly return of fish to their river spawning grounds—indeed, the daily life of the dwellers in the ocean perhaps more than that of their land brethren, is a capital illustration of the power. Here there are no stars, land-outlines, hills, variations of light, climate, winds, scents, *etc.* The salmon, sturgeon, whale, dolphin, turtle, do not get "lost" in the trackless monotone of their environment. It may be possible to explain the return of bees by sight or scent to their floating hives, from miles-away wander-

**Loco cit.*

ings, during which time the hive-keepers have drifted their boats several miles down the Mississippi or Nile. (The theory I advance will certainly not fit such cases). Or, again, the migrations of birds may perhaps be explained by the fact of the older birds that have been over the route before, training and leading the flocks of the younger ones. But such devices cannot explain the flight of carrier-pigeons, the perfect certainty and unerringness of our sixteen observations.

The facts, too numerous to overlook, too well-certified to, to doubt, must therefore be considered beyond all question.

II. But such facts are not sporadic and exceptional. They take place all about us, and all over the world every day. I believe the power has been one of transcendant importance to the preservation of whole species and genera of animals. Since the power of locomotion became at all developed in the earliest stages of animal life, almost every animal has been under the imperious necessity of leaving his fellows, offsprings or home, to get food, or to avoid becoming food. A necessity so stringent must have developed in the animal organism a power of accomplishing it without being "lost." The inability to return over unknown grounds,

through trackless spaces, means not only the loss of the young, but possibly of the species, and when this precious product of nature is in danger she has never failed to find the means of forefending such a catastrophe. Without the aid of this power the animal world would have been starved and stunted, and the freedom of wide movement, with all that implies, would have given place to an ant-like timidity and a slavish dependence upon the herd or tribe, and the limitations of the other senses. This power does indeed seem to be a true "sixth sense," and it is remarkable that it has been overlooked and ignored by scientists. It would be hard to think of the world so dependent upon the principle of gregariousness as the absence of this sense would necessitate. Individualism and the resultant growth of intellect, the evolution of peculiar ability and activity apart from that of the commune or grex, would have been impossible. Gregariousness bars the exceptional development of the individual whether of an ant, a sheep, or a negro.

III. Before this beautiful problem—the exact nature of the "instinct"—the world of science as well as of vulgar curiosity, stands in blank dumb wonder. No explanation is offered deserving a moment's consid-

eration even as a tentative hypothesis. Indeed absolutely none at all is offered of such facts as observations 15 and 16. It is therefore with a good deal of hesitation that I offer the following suggestions: After pondering over the matter for a couple of years I believe the theory at least worthy of serious consideration as a "working hypothesis."

IV. A "sense" is the reaction of some peculiar mechanism of the organism, whereby it gains knowledge of the environment for its advantage in the struggle of life. The mechanism is but a specialized adaptation of a part for the function, which is in a degree possessed by all the protoplasm of the body. The means of conveying the stimulus to the organ is by some peculiarity of action of the outside world. In the soluble substances, *contact* has produced the sense of *taste*, in resisting substances the sense of *touch*. Volatile substances appeal to the sense of *smell* (a refinement of contact and touch). *Distant bodies* become known by *audition* through ærial vibration, and by *sight* and the *temperature-sense* through etherial vibrations. What other forces of the environment exist to which protoplasm is sensitive? There is one that certainly exists, powerful, constant, continuously present, uninterruptedly streaming through

our bodies, and bathing every atom with its subtle life. This is the force of terrestrial magnetism or electricity. The phenomena of magnetism and electricity are variants of the same unity, both being probably tensions and stresses of the ether whose specific vibratile energies constitute the sources of radiant heat and luminous sensation. Life is a continuous mutation of chemical forces in every molecule, and magnetic and electric phenomena are necessary concomitants of every chemical change. The functional activity of every nerve is associated with electrical phenomena. The earth's waters are full of creatures utilizing these forces for defense, attack, or various service.⁵

Electro-physiology is a science of great importance whose study has only been begun by Matteucci, Du Bois Reymond, Pflüger, Von Bezold, *etc.* The uses of electricity in therapeutics have become routine in every physician's hands. Similar uses of the magnet may be found indicated in Van Sant's, "The Physiological Action of Magnetism," (*Jour. Psychol. Med.*, N. Y., 1870); Hammond's "Therapeutical Use of the Magnet" (*Neurological Contributions* No. 3), *etc.*, *etc.* Metallo-therapy, together with the later experi-

⁵ The *Gymnotus electricus*, the *Torpedo vulgaris*, the *malapterus electricus*, *etc.*, *etc.*

ments upon the insane and hysterical with magnets may be also mentioned. All of these only prove that the organism is interpenetrated by and responsive to magnetic forces, and it is easy to suppose possible an utilization of these forces, if such would be of profit to the organism in its evolution, for special objects of advantage in the struggle for life. Such a decided advantage would be the ability to return home through unknown country or sea, after the day's chase by pursuer or pursued, in the hunt for food, or in the thousand accidents of carnivorous life. The herders, the sheep, buffalo, etc., do not need, or seem to have the power in functional action to-day.

V. Is it possible for the animal organism to develop such a response to the magnetic and electrical forces of the earth as to gain an intimation of the direction of its distant home? To me not only is any other means of gaining such intimation absolutely unthinkable, but this one fits the case so appositely that I am astonished that no one has advanced it. The magnetometers and declinometers and compasses of science give the hint. Why may there not be an organic magnometer whereby the animal orients himself?

One important distinction needs to be

kept in mind: The real purposes which the two, the organic and scientific magnetometer, are to subserve, are widely different. The animal, properly speaking, does not want to locate *himself*, does not even need to *locate* or know the distance of his distant home; he only needs to know the *direction* of the home. But the traveler, by land or sea, cares not a fig for the north-pole, but only for his own placing. The north pole of the animal is his home, and his use of the earth's magnetic forces need only be such as to give him indications of direction—east or west, north or south, matters not to him, only such stressing of a nerve-ending or nervous-centre as to point attention in one direction rather than others. It seems to me a necessity of logic and of the facts that some such mechanism must exist in the nervous system. I picture the matter somewhat like this: At the home, this mechanism remains in a condition of rest or equilibrium; habit begets such an equilibration that there is no stimulus or tension whilst there and remaining under the play of the uniform magnetic forces of that neighborhood. Remove the animal to a locality where (as is the case) there is a difference of magnetic tension, another consensus of magnetic and electric forces, and at once the magnetic sense-organ feels tension, stress, or

torsion, there is unrest and dissatisfaction. Motion toward the animal's north-pole, the home, gives relief and increased satisfaction; motion away from the same, the reverse. With the perfection of the magnetic sense, the experiment of motion toward or away from home, would become unnecessary, and indications of direction would at once become clear when the animal's nose was turned *toward* home.⁶ In the observations cited it is evident that the swift certainty of direction is derived from no landmarks, no scent, no sounds, no knowledge of water ways, or trend of the land, no stars or sun. In case 15, the dog went "as if he were following an air-line toward a visible goal." If it be objected that the forces of terrestrial magnetism are too slight to give sufficient pressure upon or indications to nerve-endings, I should answer that the objection betrays an ignorance of the almost infinite nothingness of the force of the etherial stimulus of the retina. A change of tint from that of 756 to that of 763 billions of

6 NOTE.—Mr. Lord suggests the power is the result of high training. I should say it is the result of exceptional preservation of the power. Doubtless the persistent influence of domestication has dulled the power in some dogs. The resumption of habits of chase, perpetuated by breeding would preserve or re-arouse the fading "instinct." In such a case it would indeed be a result of training, but not a *de novo* creation.

vibrations per second is a change of force unmeasurably smaller and more delicate than that producing torsion or dip of the magnetic needle.

The discovery of Faraday that all substances are either diamagnetic or paramagnetic helps our mind here. All bodies arrange themselves either equatorially or axially in the magnetic field. No metallic compass boxed like a ship's needle is therefore needed. Both paramagnetic and diamagnetic substances exist in the body, and hence there is no impossibility from this side of such an organic magnetometer. The earth's magnetic and electric forces, different in every different locality, gives the source of the external stimulus, and it is abundantly proved that protoplasm and the body in all its parts is responsive to such forces. There remains only the proof of the register, the specialized organ, the nervous mechanism that would show tension or torsion or pressure or other indication of non-equilibrium, when it is removed from the locality where habit has engendered rest. At the north-pole the needle stands perpendicular, in equilibrium. At the animal's home an analogous condition may be supposed to exist. Remove the needle and its pointings and its declination tell where

it would be at rest ; remove the dog from its north-pole and the differences of magnetic pressure may reasonably be supposed to indicate the direction of magnetic rest.

VI. Is there any indication in physiological psychology, or brain anatomy, of the existence of such a specific organ of the magnetic sense ? The differentiation and localization of cerebral function is at present in such a state of uncertainty that only the cortical centers of motion and vision are reasonably certain and definite. There is one organ in the central line at the base of the brain that has always been a puzzle to the physiologist. No function could be ascribed to it, or use found for it.

Struck by its position, and evident though mysterious importance in the animal economy, Des Cartes considered it the seat of the soul itself. This is the pineal gland. In view of the fact that it fails upon stimulation to give any indications of function, and that none has ever been ascribed to it, it must be held highly curious and anomalous that it is such an extremely vascular organ. This becomes all the more perplexing in view of the common opinion that it is the remains of some atrophied organ of functional service to lower forms of life. We know it was an organ of far more pronounced develop-

ment in some extinct amphibians. Mr. Baldwin Spencer's beautifully illustrated paper (*Journal Microscopy*, 1887), apparently clearly demonstrates that it is in all mammalia the rudiment of what was once a functional eye in the Ichthyosaurus, Plesiosaurus, and other now extinct animals. In certain species of lizards, e. g., the New Zealand sphendon, the process of extinguishing the median "eye" seems only partially carried out at the present time. At the vertex of the head there is a modified central scale covering a gap, the parietal foramen, in which lies the "eye," connected by its stalk or "optic nerve," with the epiphysis or pineal gland. The "eye" has all the essential structures of the normal eye, retina, lens, transparent media, *etc.* In one instance the pineal nerve does not exist, though the "eye" and "gland" are present. In yet others the "eye" is wholly within the skull, the parietal foramen having closed. In this connection certain queries arise in my mind: What utility and stringent necessity of the organism could have called into being so complex and highly differentiated a structure as the median eye, which need then disappeared, and left the eye to atrophy throughout countless ages of time? What need was there of a

third "eye?" The old proverb of a cat's need of nine tails comes to mind. Moreover, magnetism being a mode of action of the ether, may it not rather be possible that, at least in its early development, the organ of the focalization of magnetic forces was affected by means similar to the eye, that focalizes ethereal vibrations? If so, the retreat of the organ from the surface to within the skull, and its limitation to the so-called gland, would be possible, (since magnetic forces penetrate all matter), and would be an advantage in evolution. But all this is the limit of fanciful speculation, and I return to my contention that for a functionless organ to remain so highly organized and vascular through millions of years and in numberless species of animals, seems to me altogether too much like crediting our grand old Mother Nature and her daughter, Evolution, with the sense of a mechanism and the adaptations of a fool. Examining the embryological development of the gland we are struck by its early appearance and the universality of its existence in the vertebrata—or those animals having the locomotor functions best developed. Balfour calls it "the most remarkable organ in the roof of the thalamencephalon," and describes its noteworthy peculiarities at length. (*Embryology*, Vol.

II, pp. 356 et seq.). Of exceptional interest is the sabulous matter at its base, the so-called *acervulus cerebri*, or sand-heap, composed of the phosphates and carbonates of lime and magnesia, bodies extremely diamagnetic. The surrounding medium, the "ferric solution," the blood, is highly paramagnetic. According to the law of the second category of Faraday's magneto-crystallic phenomena, the difference of susceptibility between the body and its surrounding medium would here be emphasized and give origin to the differences of tension required in the organic magnetometer. In this way it might be possible for the diamagnetic phosphates of the *acervulus cerebri* to react to the traversing magnetic current sufficiently to convey to the nerve end-organs tensile intimations of direction.

I have been able to gather little of definite value from cases of pathology of the pineal gland. In one case a tumor of the gland produced, among other symptoms, restlessness and a tendency to walk, and a giddiness or vertigo, phenomena that might be expected on the theory above tentatively broached.⁷

⁷ The gland, be it noted is one of the very few single organs of the body, as there are very few single functions, bilateralism being the rule. The faculty of articulate speech has a single cortical center. The organic magnetometer must necessarily be a single organ.

VII. Finally the thought seems worth recording that homesickness may have a physical basis. If, as suggested, there be such a nervous reaction to the magnetic and electric currents of the earth, then the human nostalgia heretofore considered as a matter of pure sentiment and mentality, may turn out to be founded upon disturbed equilibrium of the organic magnetometer. A feeling of unrest and subjective concentration has been noticed in animals before they resolve upon their homeward journey. If in human beings, from disuse and other reasons, the functional activity of the magnetic sense-organ is not sufficiently clear to govern direction of the body homeward, it may be strong enough to give the nervous system a sense of unusualness and strain, that co-operating with, if not causing, the longing, may set up the pronounced home-sickness.⁸ I am convinced beyond any doubt that the visions and yearnings of the home-sick youth are quite as much for the sights, the house, the hills, the *locus*, as for the friends

⁸ I have been twice startled to find myself "lost" in woods, in cloudy or foggy days. There was a decided feeling that I should turn one way rather than another, that was not derived from any conscious conclusions as to landmarks, *etc.* I never trusted the "instinct," or obeyed it. I am told that travelers lost on prairies, have learned the best way back to camp is to move forward as it were blindly, not trusting their ordinary senses at all.

themselves. If all one's friends are about him, and the home far away, there yet remains the most pronounced dissatisfaction. When I return to the home of my boyhood, where strangers now live, there is a sense of rest and peace that is wholly apart from human associations and beyond the capacity of words to explain.

Indeed, the scope of the function is yet wider, and has a significance that is political, national, and historical. Few facts are more striking in the distribution of peoples and the habits of nations, than the unreasonableness of individuals, tribes, and even races, about removal of residence. Statesmen and sociological students know this deep instinct must be allowed for as always in the count. Tyrants and the enslavers of mankind have really built upon this fact, systems of extortion and wrong that otherwise would not have been borne. Families and societies stick to a spot once settled upon despite volcanoes, earthquakes, floods, drouths, malaria, illness, niggardliness of the earth, and a hundred other causes, any one of which were enough to drive him forth, if man were a reasoning creature, and were not forced to remain by some power he knows not of. If you ask such why they do not migrate they can give you no better

reason than the cat that starves about the deserted house. The strange destiny that drives people back to the place of their nativity out of more fruitful lands, or that makes them seek it in order to die, is a common observation. Another instance is the fatality that pursues a criminal and makes him return to his home where he is known, and where the danger of capture or detection, or the shame of his life is borne, rather than live safely or unknown among the strangers of a distant country. The last pathetic echo of the yearning is in the desire to be taken home, and buried there, after the death far away.

VIII. The chief points I have tried to make clear are these:

1. It is certain that some animals are able to proceed to their distant homes from places and across countries they have never seen or known, and by means of some power other than the ordinary action of the so-called five senses.

2. This power, far from being exceptional has been of the greatest importance in the evolution of animal life upon the globe, and has been universally operative in the vertebrata, and animals whose powers of locomotion have been highly developed.

3. Common sense and science are abso-

lutely at a loss for any conceivable explanation of the strange power. In default of a better the following is thrown out as a tentative or working hypothesis.

4. The magnetic and electric forces of the earth are continuous, different for different localities, known to influence the body profoundly, and offer an external stimulus sufficiently strong and clear to give intimations of direction to a properly constructed receptive mechanism.

5. The supposition of an organic magnetometer, a mechanism for reaction to the earth's magnetic and electric forces, is logical and not contradicted by any inherent impossibility. At the animal's home there is a condition of rest developed by habit; transfer the animal to a distance and the difference of magnetic impact produces stress, torsion or indications of direction toward the position of equilibrium. The animal's north-pole is his home.

6. Perhaps the pineal gland, an organ whose function has hitherto been unknown, with its diamagnetic acervulus and paramagnetic blood, may be the organ of the magnetic sense. The discovery that it is the remnant of a median "eye" once functional—or supposably so, as an "eye,"—in now extinct animals, does not render such a sup-

position impossible, but rather adds to its probability.

7. The hint is added that nostalgia may have a physical basis, as well as the strange peculiarity that fastens people to an inhospitable spot, or drives them back to it.*

*The writer recognizes perfectly well the speculative character of the above suggestions, and regrets his present inability to prove or disprove the same by experiment. He would suggest the trial of permanent magnets strapped to a dog's head, the dog having been proved to possess a certain homing power in other or differently placed trials. Other experiments will suggest themselves to any one having the time and opportunity to carry them out. Dissection of the "glands" of animals possessing the homing power, as compared with others not having it, macroscopical and microscopical examinations, etc., would be of interest.

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